

Appl. No. 10/076,608
Rule 312(a) Amdt. dated August 11, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1-17 (canceled)

Claim 18 (allowed): A mold clamping unit which is used in a molding apparatus and serves to open and close a mold having a movable mold plate and a fixed mold plate, said mold clamping unit comprising:

a mold clamping cylinder driven by supply or discharge of a working fluid, said mold clamping cylinder for moving said movable mold plate between a fully open position in which said movable mold plate is separated by a predetermined distance from said fixed mold plate and a closed position in which said movable mold plate is in contact with said fixed plate;

mold opening means for applying a mold opening force of a predetermined magnitude to said movable mold plate in the direction from said closed position toward said fully open position and moving said movable mold plate from said closed position to a predetermined half-open position located between said closed position and said fully open position;

switching means for switching a mold clamping force generated by said mold clamping cylinder between a first mold clamping force which is larger than said mold opening force and a second mold clamping force which is smaller than said mold opening force by switching the supply pressure of the working fluid supplied to said mold clamping cylinder; and

control means for controlling said mold opening means and said switching means, a mounting stand on which said fixed mold plate is mounted;

a mounting plate on which said movable mold plate is mounted, wherein said mold opening means comprises an extension and contraction mechanism which is disposed between said mounting stand and said mounting plate and can extend and contract along

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the mold clamping direction, a drive source for driving said extension and contraction mechanism, and stop means for stopping the extension and contraction motion of said extension and contraction mechanism when said movable mold plate has been moved from said closed position to said half-open position; and

a position adjusting tool, disposed between said extension and contraction mechanism and said mounting stand, capable of adjusting the position said of extension contraction mechanism in the mold clamping direction, said position adjusting tool comprising a first block having a first surface and a second surface on the side opposite to the first surface and a second block having a third surface that is slidably in contact with said second surface of said first block and a fourth surface on the side opposite to the third surface and has a configuration, with respect to said first and second blocks, such that the spacing between said first surface and said fourth surface can be adjusted by the mutual wedge effect of said first block and said second block.

Claim 19 (allowed): An injection molding apparatus comprising:

a mold having a fixed mold plate and a movable mold plate;

an injector for injecting a plasticized resin into a cavity of said mold closed; and

a mold clamping unit for opening and closing said mold, wherein said mold clamping unit comprises:

a mold clamping cylinder which is driven by supply or discharge of a working fluid, and moves said movable mold plate between a fully open position in which said movable mold plate is separated by a predetermined distance from said fixed mold plate and a closed position in which said movable mold plate is in contact with said fixed plate;

mold opening means for applying a mold opening force of a predetermined magnitude to said movable mold plate in the direction from said closed position toward said fully open position and moving said movable mold plate from said closed position to a predetermined half-open position located between said closed position and said fully open position;

switching means for switching a mold clamping force generated by said mold clamping cylinder between a first mold clamping force which is larger than said mold opening force and a second mold clamping force which is smaller than said mold opening

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force by switching the supply pressure of said working fluid supplied to said mold clamping cylinder;

control for controlling said mold means opening means and said switching means;
a mounting stand on which said fixed mold plate is mounted and an mounting plate on which said movable mold plate is mounted, wherein said mold opening means comprises an extension and contraction mechanism which is disposed between said mounting stand and said mounting plate and can extend and contract along the mold clamping direction, a drive driving said source for extension and contraction mechanism, and stop means for stopping the extension and contraction motion of said extension and contraction mechanism when said movable mold plate has been moved from said closed position to said half-open position;

a position adjusting tool, disposed between said extension and contraction mechanism and said mounting stand, capable of adjusting the position of said extension and contraction mechanism in the mold clamping direction, said position adjusting tool comprising a first block having a first surface and a second surface on the side opposite to the first surface and a second block having a third surface that is slidably in contact with said second surface of said first block and a fourth surface on the side opposite to the third surface and has a configuration, with respect to said first and second blocks, such that the spacing between said first surface and said fourth surface can be adjusted by the mutual wedge effect of said first block and said second block.

Claim 20 (new): A mold clamping unit which is used in a molding apparatus and serves to open and close a mold having a movable mold plate and a fixed mold plate, said mold clamping unit comprising:

a mold clamping cylinder driven by supply or discharge of a working fluid, said mold clamping cylinder for moving said movable mold plate between a fully open position in which said movable mold plate is separated by a predetermined distance from said fixed mold plate and a closed position in which said movable mold plate is in contact with said fixed plate;

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mold opening means for applying a mold opening force of a predetermined magnitude to said movable mold plate in the direction from said closed position toward said fully open position and moving said movable mold plate from said closed position to a predetermined half-open position located between said closed position and said fully open position, said mold opening means being independent of said mold clamping cylinder;

switching means for switching a mold clamping force generated by said mold clamping cylinder between a first mold clamping force which is larger than said mold opening force and a second mold clamping force which is smaller than said mold opening force by switching the supply pressure of the working fluid supplied to said mold clamping cylinder; and

control means for controlling said mold opening means and said switching means.

Claim 21 (new): The mold clamping unit according to claim 20, wherein said control means controls said switching means so that said mold clamping force becomes said first mold clamping force for moving said movable mold plate to said closed position.

Claim 22 (new): The mold clamping unit according to claim 20, wherein said control means controls said mold opening means and also controls said switching means so that said mold clamping force becomes said second mold clamping force, for moving said movable mold plate from said closed position to said half-open position.

Claim 23 (new): The mold clamping unit according to claim 20, wherein said control means controls said mold opening means and also controls said switching means so that said mold clamping force becomes said second mold clamping force for moving said movable mold plate from said closed position to said half-open position, and after said movable mold plate has been moved to said half-open position, said control means controls said switching means so that said mold clamping force becomes said first mold clamping force, for moving said movable mold plate toward said closed position.

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Claim 24 (new): The mold clamping unit according to claim 20, comprising a mounting stand on which said fixed mold plate is mounted and a mounting plate on which said movable mold plate is mounted, wherein said mold opening means comprises an extension and contraction mechanism which is disposed between said mounting stand and said mounting plate and can extend and contract along the mold clamping direction, a drive source for driving said extension and contraction mechanism, and stop means for stopping the extension and contraction motion of said extension and contraction mechanism when said movable mold plate has been moved from said closed position to said half-open position.

Claim 25 (new): The mold clamping unit according to claim 24, wherein said extension and contraction mechanism is a hydraulic cylinder; said drive source is a hydraulic pump supplying a working fluid to said hydraulic cylinder; and said stop means is an end portion on the rod side of a cylinder tube which is brought in contact with the piston when said hydraulic cylinder extends.

Claim 26 (new): The mold clamping unit according to claim 24, comprising a position adjusting tool, disposed between said extension and contraction mechanism and said mounting stand, for adjusting the position said of extension contraction mechanism in the mold clamping direction.

Claim 27 (new): The clamp molding unit according to claim 20, wherein said molding apparatus is an injection molding apparatus.

Claim 28 (new): An injection molding apparatus comprising:
a mold having a fixed mold plate and a movable mold plate;
an injector for injecting a plasticized resin into a cavity of said mold closed; and
a mold clamping unit for opening and closing said mold, wherein said mold clamping unit comprises:

a mold clamping cylinder which is driven by supply or discharge of a working fluid, and moves said movable mold plate between a fully open position in which said

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movable mold plate is separated by a predetermined distance from said fixed mold plate and a closed position in which said movable mold plate is in contact with said fixed plate;

mold opening means for applying a mold opening force of a predetermined magnitude to said movable mold plate in the direction from said closed position toward said fully open position and moving said movable mold plate from said closed position to a predetermined half-open position located between said closed position and said fully open position, said mold opening means being independent of said mold clamping cylinder;

switching means for switching a mold clamping force generated by said mold clamping cylinder between a first mold clamping force which is larger than said mold opening force and a second mold clamping force which is smaller than said mold opening force by switching the supply pressure of said working fluid supplied to said mold clamping cylinder; and

control means for controlling said mold opening means and said switching means.

Claim 29 (new): The injection molding apparatus according to claim 28, wherein said control means controls said switching means so that said mold clamping force becomes said first mold clamping force for moving said movable mold plate to said closed position.

Claim 30 (new): The injection molding apparatus according to claim 28, wherein said control means controls said mold opening means and also controls said switching means so that said mold clamping force becomes said second mold clamping force, for moving said movable mold plate from said closed position to said half-open position.

Claim 31 (original): The injection molding apparatus according to claim 28, wherein said control means controls said mold opening means and also controls said switching means so that said mold clamping force becomes said second mold clamping force, for moving said movable mold plate from said closed position to said half-open position, and after said movable mold plate has been moved to said half-open position, said control means controls said switching means so that said mold clamping force

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becomes said first mold clamping force, for moving said movable mold plate toward said closed position.

Claim 32 (new): The injection molding apparatus according to claim 28, comprising a mounting stand on which said fixed mold plate is mounted and an mounting plate on which said movable mold plate is mounted, wherein said mold opening means comprises an extension and contraction mechanism which is disposed between said mounting stand and said mounting plate and can extend and contract along the mold clamping direction, a drive driving said source for extension and contraction mechanism, and stop means for stopping the extension and contraction motion of said extension and contraction mechanism when said movable mold plate has been moved from said closed position to said half-open position.

Claim 33 (new): The injection molding apparatus according to claim 32, wherein said extension and contraction mechanism is a hydraulic cylinder; said drive source is a hydraulic pump supplying a working fluid to said hydraulic cylinder; and said stop means is an end portion on the rod side of a cylinder tube which is brought in contact with the piston when said hydraulic cylinder extends.

Claim 34 (new): The injection molding apparatus according to claim 32, comprising a position adjusting tool, disposed between said extension and contraction mechanism and said mounting stand, for adjusting the position of said extension and contraction mechanism in the mold clamping direction.